

### **Dynamic Visual Acuity: a Functionally Relevant Research Tool**

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Coordinated movements between the eyes and head are required to maintain a stable retinal image during head and body motion. The vestibulo-ocular reflex (VOR) plays a significant role in this gaze control system that functions well for most daily activities. However, certain environmental conditions or interruptions in normal VOR function can lead to inadequate ocular compensation, resulting in oscillopsia, or blurred vision. It is therefore possible to use acuity to determine when the environmental conditions, VOR function, or the combination of the two is not conducive for maintaining clear vision.

Over several years we have designed and tested several tests of dynamic visual acuity (DVA). Early tests used the difference between standing and walking acuity to assess decrements in the gaze stabilization system after spaceflight. Supporting ground-based studies measured the responses from patients with bilateral vestibular dysfunction and explored the effects of visual target viewing distance and gait cycle events on walking acuity. Results from these studies show that DVA is affected by spaceflight, is degraded in patients with vestibular dysfunction, changes with target distance, and is not consistent across the gait cycle. We have recently expanded our research to include studies in which seated subjects are translated or rotated passively. Preliminary results from this work indicate that gaze stabilization ability may differ between similar active and passive conditions, may change with age, and can be affected by the location of the visual target with respect to the axis of motion.

Use of DVA as a diagnostic tool is becoming more popular but the functional nature of the acuity outcome measure also makes it ideal for identifying conditions that could lead to degraded vision. By doing so, steps can be taken to alter the problematic environments to improve the man-machine interface and optimize performance.